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*Beaufort County Comprehensive
Plan*
Natural Resources



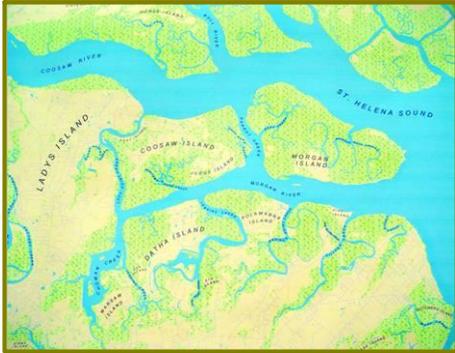
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Introduction

Protection and preservation of Beaufort County's natural resources is a principal component of this plan. Beaufort County has a unique natural beauty, made up of expansive marsh vistas teeming with marine life, sub-tropical maritime forests of live oaks and palmettos, towering pines, forested wetlands of cypress and tupelo and over 30 miles of beaches. Beaufort County residents and visitors have a great attachment to the land and water. Many symbols of the region are an indicator of the region's ecological well-being. Shrimp boats plying the waters and vast expanses of *Spartina* grass waving in the breeze are an indicator of good water quality. Live oaks and Spanish moss point to good resource protection and air quality. Beaufort County's natural environment, however, cannot be taken for granted. If not managed properly, the County's rapid pace of growth will have grave consequences for water quality, forest communities, wetlands, and beach erosion.



Physical Features and Constraints

Beaufort County, like all coastal areas in the southeast, continues to attract new residential and commercial development. The County's geographical and environmental characteristics, however, place many limitations to development. Beaufort County consists of more water than land. Of its 468,000 acres, approximately 51% consists of open waters, sounds, marshes, and estuaries. An additional 14% are freshwater wetlands. The ubiquitous presence of tidal waters, low elevation, and waterlogged soils present unique constraints to development and make the natural environment particularly vulnerable to the impacts of growth. Beaufort County is also susceptible to many natural hazards, including hurricanes, shoreline erosion and earthquakes.

CLIMATE AND WEATHER

The climate of Beaufort County is subtropical, characterized by long, hot summers followed by short and relatively mild winters. The County's precipitation rate averages 49 inches per year with about 70% of the annual rainfall occurring during the April through October growing season. The Sea Islands commonly have winter temperatures 3 to 5 degrees warmer and 30 to 40 additional frost-free days than the more inland areas. Historically, an average of one hurricane or tropical storm visits the South Carolina coast every 4 to 5 years. Since 1900, eight category 2 or larger storms have made landfall in Beaufort County, which is especially vulnerable to storm surge flooding due to its low-lying nature and relatively shallow offshore waters.



Storm looming over the Cheshessee River.

ELEVATION

Beaufort County is generally flat and low-lying with elevation ranging from sea level to 42 feet in the Gray's Hill portion of northern Port Royal Island. The County's low elevation makes it very vulnerable to coastal flooding. Approximately 400 square miles or 2/3 of the County's land mass lies within the 100-year floodplain. The primary factors contributing to flooding are storm surges associated with

hurricanes, tropical storms and northeasters. To help predict the impact of future storms, the National Weather Services has produced the sea, lake and overland surge from hurricanes (SLOSH) model (Map 5-1). During a category 3 storm, over 70% of the County's uplands would be under water. A category 5 storm would render all but 7% of the County's land area under water.



The County's low elevation makes it very vulnerable to coastal flooding.

Even a modest increase in sea level would have a profound impact on Beaufort County. In 2007, the Intergovernmental Panel on Climate Change estimated that global sea level is likely to rise 7 to 23 inches over the next century, but also indicated that the sea could rise an additional 3 to 6 inches if polar ice sheets begin to disintegrate. Along the mid-Atlantic coast, sea level rise is generally expected to be 4 to 8 inches more than the global average rise.¹ Sea level rise and higher evaporation rates are expected to increase storm frequency and severity, worsening such environmental hazards as storm surge flooding, erosion, and saltwater infiltration into ground water.

SOILS

Beaufort County's soils also place many constraints to development. As classified by the United States Dept. of Agriculture Natural Resources Conservation Service (NRCS) Soil Survey, Beaufort County has 36 different types of soils in addition to water areas, borrow pits and beach areas. The five most common soils are Bohicket association (24%), Capers association (10%), Wando fine sand (8%), Coosaw loamy fine sand (6%), and Seabrook fine sand (5%).



Organic fall crops on St. Helena Island.

Hydric Soils: A hydric soil is a soil that is saturated with water for all or part of the growing season. Hydric soils have a low infiltration potential and high runoff potential. NRCS has classified 73% of the soils in Beaufort County as hydric (Map 5-2). The wet nature of Beaufort County's soils affects the location of suitable agricultural areas and building sites, the rate of stormwater runoff, and the functionality of septic systems.

Agriculture: The NRCS has inventoried land that can be used for the agriculture. Prime farmland is land that has the best combination of physical and chemical characteristics for producing crops. The second category, farmland of state importance, includes areas of soils that nearly meet the requirements for prime farmland and that economically produce high yields of crops when treated and managed according to acceptable farming methods. The NRCS has designated 90% the County upland acreage as "prime" or "additional farmland of state importance." These designations are assigned due to soil characteristics

¹ Intergovernmental Panel on Climate Change, Climate Change 2007 Synthesis Report

and a location that is favored by warm moist air from the nearby ocean and tidal streams. The USDA stipulates that, when the soils are well managed, they are among the most productive in the region. Some of the soils identified as important farmland require irrigation or drainage. This is due to the high water tables in the area and the abundance of sandy soils (Map 5-3).

Preservation of farmland in the County is important to the maintenance and growth of local food production, the economic well being of local farmers, and maintenance of green space. Much of the land suitable for agriculture has been committed to development. The remaining farmland is concentrated on St. Helena Island, northern Port Royal Island and north of the Whale Branch River. Efforts to preserve remaining farmland should be focused on these areas.

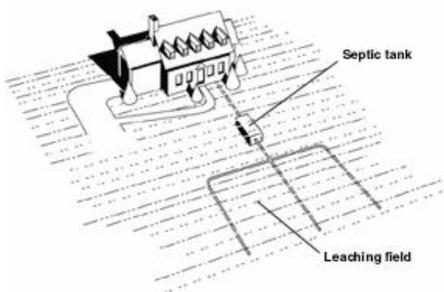


Diagram of a typical on-site sewage disposal system.

On Site Sewage Disposal Systems: Septic tank absorption fields require soils that allow effluent to be properly distributed into the soil. The NRCS classifies 74% of Beaufort County’s soils to be “very limited” in their suitability to support septic systems. In fact, no soils in the County are classified as “not limited”, the most ideal environment for septic systems. The State (SCDHEC) has different criteria than the NRCS for installation of septic tank absorption fields. The NRCS criteria are three foot depth from the bottom of the drain field to the water table, while SCDHEC requires a six inch depth from the bottom of the drain field to the high water table. SCDHEC makes the determination by looking at soil indicators, thereby removing the seasonal variation in water table levels as a criterion. Because many sites in South Carolina are unsuitable for conventional on-site wastewater systems, the SCDHEC Bureau of Environmental Health has developed 15 alternative standards with specific requirements designed to provide proper on-site treatment on disposal of domestic wastewater.²



Only 24% of the County’s soils do not have severe limitations to the construction of dwelling units

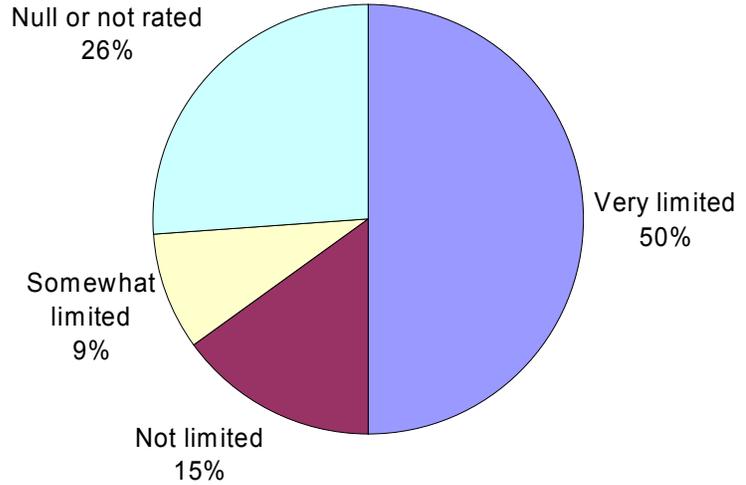
Construction: The fragility of the soils in the County is illustrated further by the NRCS designations of soils that are suitable for constructing dwellings without basements. Only 24% of the soils in the County are considered to be “not limited” or “somewhat limited” for the construction of a single-family house of three stories or less. The ratings for dwellings are based on the soil properties that affect excavation and construction costs and the capacity of the soil to support a load without movement. These properties include the depth of the water table, ponding, flooding, subsidence, shrink-swell potential, and compressibility.

² Personal communication. Feb., 2008. Blaine Lyons, R.S., Environmental Health Director, Region 8, DHEC.

Chart 5-1: Suitability of Beaufort County Soils for Construction of Dwellings Without Basements



The County's geographical and environmental characteristics place many limitations to development.



Source: USDA Natural Resource Conservation Service Soil Survey

CONCLUSIONS

The constraints and limitations of the County's geography, climate and natural environment need to play a greater role in future land use planning, site plan review, and the location of infrastructure and County facilities. This is especially true of the County's soils, which affect everything from agriculture, drainage, to suitability of on-site septic systems.



Salt Marshes, Coastal Waters and Marine Resources

The health of Beaufort County's waterways and adjacent marshes is vital to the region's identity, culture and local economy. Shrimp, crabs, and oysters, staples of Lowcountry cuisine, depend on the marshes for all or part of their lifecycle. Recreational fishermen flock to the region for its abundant sheepshead, flounder, croaker, sea trout, whiting and cobia. Marshes also serve to stabilize the shoreline and help absorb floodwaters and storm surges. Finally, the quality of life created by the aesthetic and recreational opportunities serves the residents of the County and attracts tourists and newcomers.

The issue of water quality has been at the forefront of local government initiatives in Beaufort County over the last 15 years. In 1995, the closure of 500 additional acres of shellfish beds due to high levels of fecal coliform bacteria alarmed many County residents. This event sparked a heightened awareness of the importance of water quality to the overall health of the natural resources in the region and led to the creation of the Clean Water Task Force, which initiated the Special Area Management Plan (SAMP) for Beaufort County. The SAMP process led to many local programs, policies and ordinances that address water quality.



Shrimp, crabs, and oysters, staples of Lowcountry cuisine, depend on the marshes for all or part of their lifecycle.

ESTUARINE ENVIRONMENT

Of the County's 468,000 acres, 51% are tidally influenced, consisting of sounds, rivers, creeks, and marshes. With the exception of the Combahee, New and Coosawhatchee Rivers, there is an absence of freshwater rivers. The Beaufort, Broad, Colleton, and May Rivers, for example, are actually large saltwater arms of the ocean that ebb and flow twice daily with the tides. Beaufort County lies within the Savannah River and Combahee/Ashepoo/Broad River Basins and is further subdivided by five watersheds (Table 5-2 and Map 5-4).

Table 5-2: Basins, Watersheds, and Sub-Watersheds in Beaufort County

Basin	Watershed	Sub-Watershed
Savannah River	New River	
	May River/Calibogue Sound	May River Calibogue Sound
Combahee/Ashepool/ Broad River	Coosaw River/St. Helena Sound	Coosaw River
		Morgan River
		Coastal
	Broad River/Port Royal Sound	Whale Branch West
		Broad River
		Beaufort River
	Colleton Okatie River	
	Chechessee River	
	Combahee River	

Source: Watershed Water Quality Assessment: Salkehatchie River Basin, SCDHEC, 2003; Beaufort County Stormwater Management Plan, 2006, Thomas & Hutton Engineering Co.



Placards found on storm drains and catch basins.

The water bodies of South Carolina have been classified by SCDHEC based on the intended uses for each waterbody. SCDHEC uses these classifications to determine permit limits for treated wastewater dischargers and other activities that may impact water quality (see Maps 5-5 and 5-6).

Table 5-3: SCDHEC Water Body Classifications in Beaufort County

Water Classification	Description
Outstanding Resource Waters (ORW)	Waters that are an outstanding recreational or ecological resource.
Shellfish Harvesting Waters (SFH)	Tidal saltwaters protected for shellfish harvesting.
Tidal Saltwaters (SA)	Waters suitable for primary and secondary contact recreation, crabbing and fishing.
Freshwaters (FW)	In Beaufort County it applies to the upper reaches of the Combahee River.

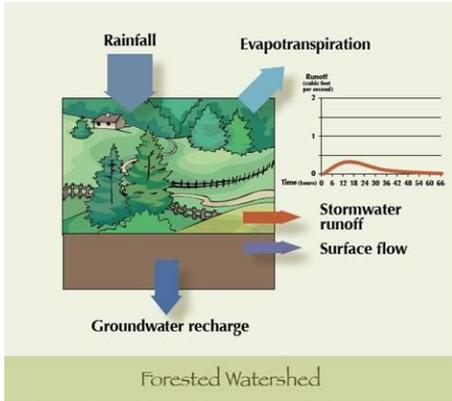
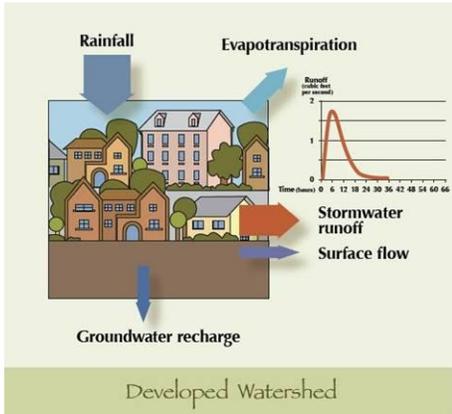
Source: Watershed Water Quality Assessment: Salkehatchie River Basin, SCDHEC, 2003

Beaufort County experiences the largest tidal range on the Atlantic coast south of Maine. The difference between high and low tide ranges between 6 feet during neap tides and 10 feet during spring tides. The region's unusually large tides are largely responsible for the prominence of saltmarshes. Smooth cordgrass (*Spartina alternifolia*) the primary plant species in saltmarshes, thrives in places where it is both submerged in saltwater during high tides and exposed to air during low tides. Each fall, smooth cordgrass dies and is slowly decomposed by bacteria. The resulting mixture, called detritus, is a major food source for

zooplankton (including the larval stages of shellfish and fish) and for clams, mussels, oysters, shrimps, and certain fish.

THREATS TO WATER QUALITY

The greatest threats to Beaufort County’s estuarine environment come from non-point source pollution associated with stormwater runoff, drainage, seepage and septic system failure. Because non-point source pollution originates from many different sources, it is difficult to control. Increased flows and pollutants from impervious surfaces, resulting from coastal development (rooftops, roads, parking lots), are a primary factor in degrading water quality. According to the National Oceanic and Atmospheric Administration (NOAA) when the amount of impervious cover without proper treatment in a tidal creek watershed exceeds 10 to 20 %, stormwater runoff greatly increases, resulting in increased concentrations and loadings of chemicals and pathogens that impair water quality and marine life. ³ In vegetated environments, a greater degree of stormwater either infiltrates into the soil or evaporates into the air. Impervious surfaces cause more of the stormwater to surge directly into tidal creeks. There are three forms of pollution that result from stormwater runoff:



Source: Tidal Creek Habitats: Sentinels of Coastal Health, NOAA.

Animal Pathogens: The presence of fecal coliform bacteria has been the most widespread and well-studied water quality issue in Beaufort County. Fecal coliform bacteria originate from the digestive tracts of waterfowl and mammals, including humans. Major sources of fecal coliform bacteria include malfunctioning septic systems and pet waste. When levels of fecal coliform bacteria exceed specified standards⁴ SC DHEC closes oyster beds in the area. Oysters are such highly efficient filter feeders that they filter even very small bacteria from the water. The presence of elevated fecal coliform bacteria levels may indicate that other disease-causing bacteria such as diphtheria or cholera might also be present.

South Carolina’s Department of Health and Environmental Control (DHEC) classifies water bodies and salt marshes based on their intended use for the harvesting of shellfish (SFH). Map 5-7 provides an indication of where animal pathogens are compromising water quality.

Chemical Contaminants: Chemical contaminants found in tidal creeks include substances that may be harmful to marine life as well as may cause risks to humans through consumption of seafood. Chemical contaminants include:

³ Tidal Creek Habitats: Sentinels of Coastal Health, NOAA

⁴ SCDHEC Water Classifications and Standards Fecal Coliform Standards [Section G 11(e)], “Not to exceed a most probable number (MPN) fecal coliform geometric mean of 14/100 ml; nor shall more than 10% of the samples exceed and MPN of 43/100 ml.

- Pesticides from agriculture and residential and commercial landscaping;
- Nutrients, such as phosphorus and nitrogen, resulting from fertilizer applications on farms, lawns and landscaping; and
- Polycyclic aromatic hydrocarbons (PAHs) and heavy metals derived from car exhaust and tire wear on roads and parking lots.

Changes in Salinity Levels: Large amounts of stormwater runoff into the upper sections of tidal creeks can cause rapid drops in salinity, which kills some species of small marine worms and crustaceans. These small marine animals are important food for shrimp and larval crabs. A decrease in the abundance of these animals could therefore have a negative impact on larger animals farther up the food chain.

EXISTING EFFORTS TO PRESERVE WATER QUALITY

There are two general approaches to protecting salt marshes and coastal waters through the regulatory process. They consist of limiting development in and around salt marshes and coastal waters, and controlling the quantity and quality of upland stormwater runoff.

Limiting development in and around salt marshes and coastal waters: The Office of Ocean and Coastal Resource Management (OCRM) provides protection to most of southern Beaufort County's salt marshes and coastal waters through its ownership of these areas (fee simple title) on behalf of the state. In those rare cases of King's grant or state grant lands where property owners hold title to salt marshes, development activity is strictly regulated and limited to water dependent structures, such as docks, marinas, and boat ramps. The OCRM sets a demarcation between upland and state controlled marshland or "critical areas" called the critical line.



Preserving land from development around saltmarshes is one method of protecting water quality.

- **Critical Line Buffers:** Beaufort County and its municipalities limit development adjacent to salt marshes and coastal waters by requiring development to be set back and buffered from the critical line. The purpose of this requirement is ultimately to improve water quality by capturing sediments and pollution from stormwater runoff. Requirements for critical line buffers vary between Beaufort County and its municipalities. Providing "baseline" standards for critical line buffers was a common recommendation in both the Northern and Southern Beaufort County Regional Plans.
- **Purchasing Development Rights:** Another effective water quality measure practiced in Beaufort County is limiting development in sensitive headwater areas through voluntary conservation easements (as with properties within the ACE Basin), purchase of development rights, and fee simple land purchases.
- **Limiting Development on Small Coastal Islands:** Beaufort County has hundreds of small islands with no bridge access. Almost all of these islands are surrounded by expanses of salt marsh and



Small Coastal Island in the Harbor River.

occasionally bordered by tidal creeks. While historically the lack of bridge access has protected these islands from development, there has been a growing concern that, as waterfront and marshfront property becomes scarcer, there will be a greater demand to develop small coastal islands. Providing access to these islands requires bridges and docks, both of which necessitate placing structures in salt marshes and coastal waters and creating potential threats to the health of the marsh and water quality. The State adopted regulations in 2006 that limit the construction of bridges to small marsh islands. The regulations prohibit the construction of bridges to islands smaller than two acres. For larger islands, the length of bridges is restricted based on the size of the island. Beaufort County further limits the development of small marsh islands through its Resource Conservation Zoning district which restricts residential density to 1 dwelling unit per 10 acres.

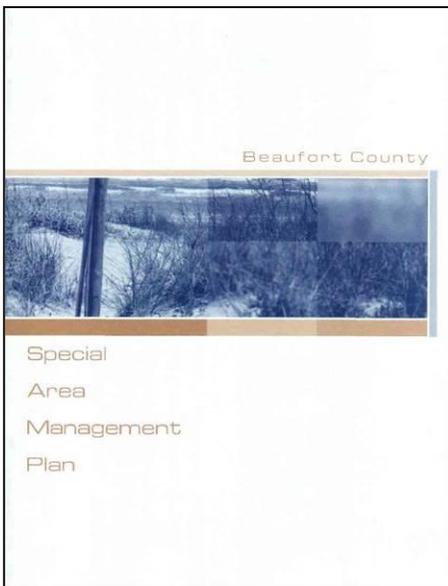
Stormwater Management: The protection of Beaufort County's water bodies was advanced in the mid-1990s with the creation of the Clean Water Task Force. Improvement of stormwater management and planning to improve water quality was one of the primary focuses of the task force and led to the creation of Beaufort County's Stormwater Best Management Practices (BMP) Manual and the Stormwater Utility.

- **Managing Stormwater Quantity:** Traditionally, stormwater management has been dealt with in terms of managing the quantity of runoff from a site in order to avoid flooding downstream. OCRM's stormwater regulations reflect this traditional approach, requiring stormwater to be detained at pre-development levels in a 10-year storm event. OCRM's requirements also control sedimentation, but do not address specific pollutants that ultimately affect water quality. Beaufort County requires stormwater systems to be designed for 25-year storm events, thus further regulating the quantity of runoff.
- **Managing Stormwater Quality:** In 1998, Beaufort County adopted the Beaufort County Manual for Stormwater Best Management Practices (BMP). The BMP Manual has specific attenuation standards for two types of pollutants; nutrients, such as phosphorus, and fecal coliform bacteria. Recognizing the negative impacts of impervious surfaces on water quality, the BMP Manual requires that on-site stormwater attenuation meet the level of 10% or less impervious development. This level is even lower (5%) for fecal coliform bacteria. In 2007, the Town of Bluffton adopted its own stormwater ordinance which placed greater emphasis on Low Impact Development (LID) stormwater approaches and long term monitoring of stormwater systems to ensure that water quality is being protected. Beaufort County revised its Manual to be more consistent with Bluffton's requirements, and is currently assessing whether additional requirements should be adopted to limit nitrogen in stormwater runoff.



Landscaped stormwater retention basin.

- **Stormwater Utility:** The Stormwater Utility was established in 2001 as a countywide program primarily aimed at maintaining and enhancing regional stormwater management systems and retrofitting older stormwater systems. The Stormwater Utility was originally recommended by the Clean Water Task Force which recognized that “any gains in better land use planning and better BMP design are likely to be overshadowed by the poor performance of existing systems that are not maintained properly.”⁵ The Utility’s activities are guided by the Beaufort County Stormwater Management Plan which was completed in 2006. The Utility partners with the City of Beaufort and the Towns of Hilton Head Island, Bluffton, and Port Royal through inter local agreements. Drainage efforts within these municipalities are supported through fees collected by the County; 95% of the fees that are collected within a municipality’s jurisdiction are then distributed back to the municipality. Oversight of the Stormwater Utility is provided by the Stormwater Management Utility Board



The Beaufort Special Area Management Plan (SAMP) led to many local programs, policies, and ordinances that address water quality.

Beaufort Special Area Management Plan (SAMP): Responding to the closure of 500 acres of shellfish beds in 1995, the SAMP was conducted to address stormwater and other sources of water pollution and to identify effective actions to prevent further degradation of the County’s waterways. The SAMP consisted of 10 work elements that addressed stormwater management, wastewater management, water quality monitoring, boating management and education. Below are some of the highlights of the SAMP:

- **Countywide Stormwater Utility:** (see above)
- **Management Plans for Broad Creek and the Okatie River:** These plans emphasize the need for stormwater BMPs, riparian setbacks and buffers, reduction of on-site septic systems, boating management, and other methods to protect water quality.
- **River Quality Overlay District:** This District would address such concerns as setbacks, buffers and appropriate impervious surface cover limits to minimize impacts of development in sensitive headwater areas.
- **Develop a Comprehensive On-Site Disposal System (OSDS) Program:** The SAMP recognized that State requirements for on-site septic systems do not account for the region’s high water table and do not control density. These two factors heighten the risk of degrading water quality. The SAMP calls for the adoption of more stringent septic system standards and for regular programs of inspection and maintenance.
- **Coordinate Water Quality Monitoring:** There is a considerable amount of monitoring of water quality in Beaufort County at the

⁵ A Blueprint for Clean Water: Strategies to Protect and Restore Beaufort County’s Waterways, Clean Water Task Force, 1997.

federal, state and local levels, but no central coordination of these efforts or dissemination of the information being gathered. Coordinating monitoring efforts would provide more efficient and effective use of the collected data and would help to identify specific pollution sources and track the overall health of the County's waterways.

- Conduct Educational Campaigns: Finally, the SAMP calls for education and public involvement in furthering water quality goals.



Great egret stalking a coastal marsh.

CONCLUSIONS

Over the last 10 years, Beaufort County has taken great strides to protect its saltmarshes, coastal waters, and marine resources. As the County continues to develop, these policies and regulations will need to be continually reevaluated and adjusted to ensure that the County's water quality goals are being met. Information is key to determining the effectiveness of existing measures to protect water quality. Currently, the County, the Town of Hilton Head Island, the Town of Bluffton and the state conduct water quality monitoring in the County's rivers and creeks, but there is no central clearinghouse or coordination of these monitoring efforts as originally recommended in the Beaufort SAMP.

Another concern is that, in spite of the many achievements in environmental protection, developments that predate newer regulations continue to contribute to water quality degradation. Also, there is still an uneven playing field between Beaufort County and some of the municipalities and neighboring counties that can result in water quality degradation. Therefore, the County needs to continually work to with its neighbors on cooperative natural resource planning, and achieving baseline environmental standards, and retrofitting stormwater management for older developments.



Trees, Forests and Habitats

Beaufort County lies almost entirely within the coastal zone of South Carolina. Upland plant communities of the coastal zone include pine woodland, bottomland hardwoods, upland oak-hickory forest, southern mixed hardwood forest, marl forest and calcareous cliff, cypress-tupelo swamps and maritime forests. Maritime forests, which support Beaufort County’s signature mature live oaks and sabal palmettos, typically occur on barrier islands immediately inland of dune systems and on sand ridges that mark former shorelines⁶.

The threats to Beaufort County’s forest communities and native habitat types are related primarily to the rapid pace of development. Comparing the 1988 Land Use/Land Cover data from the US Geological Survey to 2006 aerial photography provides a snapshot of the impact of growth on Beaufort County’s forested areas (Table 5-4). During this period of 18 years, Beaufort County has lost over 18,000 forested acres to development.



Specimen live oaks along Bay Street in Beaufort.

Table 5-4: Comparison of Plant Communities – 1988 and 2006

Plant Community	1988 Acreage	2006 Acreage	% Consumed
Deciduous Upland Forest	2,610	2,607	0.1
Evergreen Upland Forest	44,448	39,035	12.2
Forested Wetland	34,273	32,386	5.5
Herbaceous Rangeland	885	734	17.1
Mixed Upland Forest	32,502	28,136	13.5
Shrub/Brush Rangeland	1,841	1,671	9.2
Upland Planted Pine	23,925	17,891	25.2
TOTAL	140,483	122,460	12.8

Source: US Geological Survey, Beaufort County Planning Department

⁶ 2005 Comprehensive Wildlife Conservation Strategy, SCDNR

TREE PROTECTION

Beaufort County residents have long recognized the value of protecting significant trees both for aesthetic and practical reasons. Trees provide numerous public benefits including the reduction of stormwater runoff, buffering sounds and views from roads, reducing air conditioning costs in shaded buildings, and providing wildlife habitat. Beaufort County requires the preservation of specimen trees and encourages preservation of all trees greater than 8 inches diameter breast height (dbh). Removed specimen trees must be mitigated by planting a similar species with the quantity amounting to the total caliper inches of the tree removed. Other removed trees must be replaced in kind. Where a site does not have sufficient room for mitigated trees, a fee-in-lieu payment must be made to the forestation fund.

Each local jurisdiction classifies certain trees as specimen or significant trees based on the species and size of the tree. During site plan review, emphasis is placed on designing the site around specimen trees. Where trees cannot be saved, mitigation is required by planting back the total caliper inches that were removed or contributing to a reforestation fund. Each local ordinance also requires measures to protect trees during construction.

PROTECTION OF HABITATS AND FOREST COMMUNITIES

In addition to saving individual trees, only Hilton Head Island and Beaufort County require the preservation of plant communities and forest types. Beaufort County requires a site capacity analysis when property is developed. A developer must provide a survey of the site, which delineates the different forest types such as maritime forests and mixed upland forest and other natural areas such as freshwater wetlands. The amount of each forest type that must be preserved is determined by the value of the resource and the intensity of the zoning district. Hilton Head Island requires much greater protection of native understory vegetation by restricting under-brushing of buffers and other natural areas while requiring the replanting of natural plant species in disturbed areas.

ENDANGERED AND THREATENED SPECIES

According to the US Fish and Wildlife Service, there are 14 species of plants and animals that are listed as either endangered or threatened in Beaufort County. An additional 17 species are listed as “species of special concern.” Currently, only endangered and threatened species are protected by the Federal Endangered Species Act and reinforced by County standards.

Beaufort County's Definition of Specimen Trees

1. Dogwood, redbud, and southern magnolia greater than 4 inches dbh.
2. American holly, bald cypress, beech, black oak, black tupelo, cedar, hickory, live oak, palmetto, pecan, red maple, southern red oak, sycamore, or walnut with a dbh of greater than 16 inches.
3. All other trees with a dbh of 24 inches or greater.

Source: Beaufort County Zoning and Development Standards Ordinance

Table 5-5: Federally Endangered and Threatened Species in Beaufort County



Wood Storks are classified as federally endangered species.

Species	Status
West Indian manatee	Endangered
Bald eagle	Federally Protected
Wood stork	Endangered
Red-cockaded woodpecker	Endangered
Piping plover	Threatened
Kemp's ridley sea turtle	Endangered
Leatherback sea turtle	Endangered
Loggerhead sea turtle	Threatened
Green sea turtle	Threatened
Flatwoods salamander	Threatened
Shortnose sturgeon	Endangered
Pondberry	Endangered
Canby's dropwort	Endangered
American chaffseed	Endangered

Source: U.S. Fish and Wildlife Service

CONCLUSIONS

While Beaufort County has well-developed tree standards, some minor adjustments could provide further tree protection while lessening confusion and conflicts between the County and property owners. For example, existing standards to protect “specimen” trees make little distinction between a 24” mature water oak and a 50” caliper live oak. Revising these definitions to make this distinction could provide for greater protections for larger trees, while providing more flexibility for selective removal of hazardous trees such as water oaks and laurel oaks. Requiring a tree management plan could assist large planned unit developments and subdivisions in carrying out routine tree maintenance while emphasizing the overall sustainability of forest communities in common areas.

While Beaufort County and the Town of Hilton Head Island both provide for some protection of forested areas, these plant communities are often discovered only after a survey of the site is performed. What is lacking is a detailed, area wide database of valuable forest types to assist in a more proactive planning approach to resource preservation. Once certain forest types are gone, it's very difficult to replace them. Many important plant species unique to the coastal south are either slow growing or require a unique set of circumstances to be propagated. Also, Beaufort County and its municipalities should explore the provision of local requirements to protect species of special concern and provide for more “wildlife-friendly” development.



Beaches and Dunes

Beaufort County's beaches are the first line of defense against the powerful forces of wind, waves and currents. A healthy beach and dune system provides a natural storm barrier protecting life and property for those living along the coast. They also provide the basis of much of the region's successful tourism industry and are a factor in the region's attractiveness as a place in which to relocate.

EXISTING CONDITIONS

Beaufort County has approximately 39 linear miles of beaches. Like most of the Atlantic and Gulf coasts, the coastal edge of Beaufort County is made up of a series of barrier islands (Table 5-6), which take the brunt of most offshore storms, thereby protecting the County's inland estuaries and uplands. Barrier islands are composed of dune and beach ridge sands formed by the interaction of wind, waves and ocean currents, and are therefore very dynamic environments. The shapes of these islands change slowly but constantly due to weathering. Evidence of this is seen in the erosion of certain beaches such as Hunting Island and the accretion (gaining sand) on other beaches such as portions of Fripp and Harbor Islands.



Beach erosion on Hunting Island.

Dunes offer the first line of protection from the ocean. Without a healthy dune system, ocean waves rush upland, eroding high ground. Even low dunes (2 to 3 feet tall) can help to avoid this erosion.⁷ Dunes are formed when sand from offshore sandbars is washed ashore, picked up and carried by the wind, and deposited on the downwind side of natural debris that accumulates along the shore. Eventually plants such as sea oats, salt meadow cordgrass and marsh elder take root, further stabilizing the dune. Primary dunes are the first row of dunes nearest the ocean. They typically are built up during calm weather and are washed back to sea during storms. Secondary dunes, characterized by the growth of heavier shrubs and located behind the primary dunes, do not as readily wash away.⁸ Beaufort County's dunes are relatively small

⁷ How to Build a Dune, SC DHEC/OCRM

⁸ Preface to the South Carolina Beachfront Management Act, 1988

due to the lack of strong, direct winds. Hunting Island and Pritchard’s Island lack healthy dune systems and are characterized by maritime forests giving way to the forces of the ocean resulting in bleached, dead trees littering the beaches.

Table 5-6: Beaufort County’s Barrier Islands

Barrier Island	Miles of Beach	Comments
Harbor I.	1.5	Beaches generally accreting
Hunting I.	4.2	Very erosional ranging from -7 ft. to -15 ft. per year. Latest renourishment in 2006.
Fripp I.	2.9	Beaches almost continuously armored with revetments. Beaches generally stable.
Pritchards I.	2.4	No bridge access. Moderate to severe erosion. Owned and managed by the University of South Carolina.
Capers I.	2.5	No bridge access. Minimal upland.
St. Phillips I.	1.3	No bridge access. Private residence.
Bay Point I.	2.2	No bridge access. Privately owned.
Hilton Head I.	19.0	Slightly accreting at south and north ends. Greatest erosion between Coligney Circle and Folly Beach. Last renourishment in 2006.
Daufuskie I.	3.2	No bridge access. Long term erosion rates from -4 ft. to -5 ft. per year, but going as high as -10 to -11 ft. per year. Last renourishment in 1998.

Source: SC Annual State of the Beaches Report 2008, OCRM



Barrier Islands are a very dynamic environment.

THREATS

The greatest threats to Beaufort County’s beaches come from the challenges inherent in building permanent structures in a shifting natural environment. Concern about sea level rise only compounds this issue. In a natural barrier island environment, beach erosion would simply cause waves to break higher up shore. Over time, sand would be carried behind the dune system and the beach would “retreat” inland. Man-made structures interrupt this natural process, create concerns about property loss and may actually accelerate erosion.

Another potential threat to the health of Beaufort County’s beaches is beach vitex, and invasive plant that has been spreading among South Carolina’s dunes since the mid 1980s. Originally introduced in North Carolina, it has spread as far south as Folly Beach, Charleston County. Beach vitex crowds out native dune vegetation and is not effective in stabilizing dunes.

REGULATORY FRAMEWORK

Development along Beaufort County’s beaches is regulated both by state and local governments. The Hilton Head Island beaches are

entirely within the Town's jurisdiction. Beaufort County has jurisdiction over the remaining barrier islands with significant private development only occurring on Daufuskie, Harbor, and Fripp Islands.



A portion of Hunting Island's beaches were renourished in 2006 and groins were installed.

State Regulations: The South Carolina Coastal Zone Management Act (CZMA) is the primary legislation that addresses the protection and enhancement of the state's beaches. The OCRM is the state agency charged with enforcement of this legislation. The CZMA identifies three approaches to managing beaches rejecting the first and adopting the second and third as policy:

- Providing hard erosion control devices such as bulkheads and groins;
- Renourishing the beach with sand; or
- Requiring development to be adequately set back from the beach.

The OCRM regulates beachfront setbacks by first identifying a "baseline" defined as the crest of the primary oceanfront sand dune. Setbacks from the baseline are set at 40 times the average annual erosion rate or no less than 20 feet. The OCRM also prohibits the construction of erosion control devices, such as sea-walls and revetments seaward of the setback line. Groins perpendicular to the shoreline are exempted.

Local Regulations: Hilton Head Island requires additional restrictions on development of the dunes and requires a minimum 20-foot buffer from the baseline. Beaufort County requires development to be setback at least 50 feet from the crest of the primary dunes and protects dunes through its resource protection standards.

BEACH RENOURISHMENT

A significant amount of state, local, and private funds have been spent to import sand onto the County's beaches. Hilton Head Island uses its accommodations tax to fund beach renourishment. In 2006, a \$16.6 million beach renourishment project began that involved moving over 2 million cubic yards of sand to the Island's beaches. A similar project was completed in 1997. A state and federally funded renourishment of a portion of Hunting Island's beaches was completed in 2006. A privately funded renourishment of Daufuskie's beaches occurred in 1998 adding 1.4 million cubic yards of sand.



Providing public access to beaches is vital to both the quality of life for the County's residents and to the economic health of the region's tourism industry.

PUBLIC ACCESS

Between mean high tide and the water, beaches are public lands that are under the jurisdiction of the OCRM. Providing adequate public access to this amenity is vital to both the quality of life for the County's residents and to the economic health of the region's tourism industry. Beachfront property tends to be intensely developed and expensive to

acquire. These two factors create a challenge to the public sector to provide adequate access and to provide sufficient land for parking and other supportive facilities.

In southern Beaufort County, Hilton Head Island has nine public access points with approximately 1,400 parking spaces along its 19 miles of beaches. Daufuskie Island has approximately 3 ½ miles of beach with only two public access points. In northern Beaufort County, only Hunting Island State Park's four miles of beach is easily accessible. Public access to the beaches of Harbor and Fripp Islands is highly restricted with only Harbor Island providing minimal access via a gate fee and very limited parking.

Beaufort County and the Town of Hilton Head Island have both adopted policies that give local government the option to purchase beach access when land is developed or redeveloped. Beaufort County requires public access for developments with more than 1,000 feet of beach frontage.

SEA TURTLE PROTECTION



Coastal development threatens the long-term survival of loggerhead sea turtles.

Like much of the southeast coast, Beaufort County's beaches serve as nesting habitat for endangered and threatened sea turtles. Coastal development threatens the long-term survival of sea turtles because artificial lighting can deter females from nesting and disorient hatchlings, resulting in eventual death from cars, predators or desiccation. In 2001, Beaufort County adopted an ordinance regulating lighting along beaches to restrict direct light visible from beaches and dunes.

CONCLUSIONS

Beaufort County should recognize that its beaches are a public resource that need to be protected, stabilized, and made accessible to the public. Greater emphasis should be placed on promoting a healthy dune system by encouraging property owners to enhance and reestablish dune systems with native vegetation. In addition, the acquisition of new public access areas and the enhancement of existing public access are vital given anticipated population growth and growth in tourism.



Freshwater Wetlands

Freshwater wetlands serve as natural stormwater drainage systems, absorbing floodwaters and filtering out pollutants while providing a habitat for many plants and animals. Like other natural habitats, freshwater wetlands are vulnerable to the County's rapid pace of growth. Another threat, however, is the uncertain regulatory framework for freshwater wetland protection. In 2001, the US Supreme Court ruled that the US Army Corps of Engineers no longer had jurisdiction over isolated freshwater wetlands.⁹ This left isolated freshwater wetlands unprotected in much of the United States. In the mean time, the South Carolina State Legislature has introduced several bills to address the protection of isolated wetlands. There is concern, however, that the State will not adequately address wetland protection and will prohibit local governments from enacting or enforcing more stringent local legislation to protect isolated wetlands. In the meantime, the Corps continues to issue wetland determination letters on isolated freshwater wetlands, claiming many as jurisdictional due to their adjacency to navigable waterways or other jurisdictional waters.

EXISTING CONDITIONS

According to the National Wetlands Inventory (NWI), there are 34,440 acres of freshwater wetlands in Beaufort County, making up approximately 15% of the total land area. The locations of these wetlands are shown on Map 5-8. While this is not an exhaustive inventory, it provides a general picture of the quantity and location of freshwater wetlands.

REGULATORY FRAMEWORK

As stated above, until 2001 protection of freshwater wetlands was primarily addressed by the Corps of Engineers. Today, however,

⁹ Solid Waste Agency of Northern Cook County v. United States Army Corps of Engineers, January 9, 2001

protection of isolated freshwater wetlands is the responsibility of state and local governments.

Federal Wetlands Regulations: Section 404 of the Clean Water Act regulates the discharge of dredged or fill material into waterways and wetlands. Before development that impacts wetlands can occur, an applicant must demonstrate through a permit process that they have taken steps to avoid wetland impacts; that potential impacts on wetlands have been minimized; and that compensation is provided for any remaining unavoidable impacts. The U.S. Army Corps of Engineers administers and enforces federal wetland regulations. Since 2001 the Corps only regulates wetlands that adjoin navigable waters, leaving the protection of isolated wetlands up to state and local governments.



Manmade wetland attracting a great egret.

State Wetlands Legislation: Since 2001, the South Carolina Legislature has proposed several bills that address the protection of isolated wetlands. While these efforts have the potential to bridge existing gaps in wetlands protection, they would still potentially render many isolated wetlands unprotected. While the most recent bill¹⁰ provides protection of isolated wetlands that are ½ acre or greater in size, it provides many exemptions that include farming, forestry and mining activities; maintenance of flood control devices, bridges, farm ponds, irrigation ditches; and construction and maintenance of farm roads, forest roads, and access roads for utilities. The bill also prohibits local governments from enacting stricter wetlands protection regulations.

Local Wetlands Ordinances: With the current condition of federal and state wetlands protection, the role of local governments is vital to protecting isolated wetlands. Beaufort County's wetland protection regulations allow fill for nontidal wetlands less than one acre in size and require mitigation. Minor fill is also allowed in these wetlands in order to reshape the wetland boundary to provide a reasonable building site, providing that less than 10% or 2 acres (the lesser of the two) is disturbed. For nontidal wetlands, protection levels vary by zoning district, ranging from 60-100%. These regulations also give special protection to bird rookeries and high quality wetlands.

The Town of Hilton Head Island is the only other local government that has comprehensive wetlands protection requirements. The Town requires developers to attempt to preserve wetlands in their site design. If wetland alteration is proposed, it can only be permitted if the wetland is of low or moderate value, based on a wetland evaluation sheet that equates environmental, social and landscape value of the wetland with a numerical score. Minimization of the alteration in the site design must

¹⁰ South Carolina Legislature Session 117 (2007-2008) SI 16



The role of local government is vital to the protection of freshwater wetlands.

then be shown, and mitigation of the altered wetland is required. Mitigation must be done on-site, in-kind and acre-for-acre. Mitigated wetlands and their required buffers must be permanently protected through restrictive covenants. As a last resort, a fee-in-lieu-of program is available, but only when all other options have been exhausted.

The City of Beaufort, Town of Port Royal, Town of Yemassee, and Town of Bluffton currently have no comprehensive local wetland protection requirements. The establishment of baseline freshwater wetlands protection standards was a common recommendation in the Northern and Southern Beaufort County Regional Plans.

CONCLUSIONS

The role of local governments is vital to protect isolated freshwater wetlands. Beaufort County, while strengthening its own regulations, needs to actively work with its municipalities and neighboring counties to enact suitable wetland protection standards. The region also needs to work cooperatively to lobby the state to enact legislation to protect isolated freshwater wetlands while at the same time allowing local governments to enact more stringent standards.



Groundwater Resources

Beaufort County lies above the northernmost reaches of the Floridian Aquifer, which historically has supplied the region with a reliable source of water. In 1998, SCDHEC produced a map of the Floridian Aquifer charting the areas of significant groundwater recharge and areas with intense groundwater withdrawal – cones of depression (Map 5-9).

AQUIFER RECHARGE AREAS

Aquifer recharge occurs as a direct result of rainfall entering the aquifer where the overlying confining unit is thin or absent. Because the Floridian Aquifer is generally unconfined throughout Beaufort County, most of the upland areas of the County contribute some ground-water recharge to the underlying aquifers. Locally significant recharge occurs on the northern part of Port Royal Island, the northern part of Lady's Island, St. Helena Island, and on the barrier islands. The northern part of Hilton Head Island is possibly an area of recharge, but the effects of this are insignificant due to the dominating regional influence of the cone of depression centered in Savannah.

CONES OF DEPRESSION

Hydraulic cones of depression are areas in which intense local groundwater withdrawal (pumping) causes the surface of the ground water table to form a conical depression. Locally, there are two areas which indicate cones of depression. One is located on Hilton Head Island and the other is located west of Dale, just north of the Whale Branch River. Savannah's regional cone of depression continues to dominate the shifts in the local potentiometric groundwater surface.

SOURCES OF GROUNDWATER CONTAMINATION

Contamination of groundwater is caused both by pollution infiltrating soils and saltwater intrusion. Due to the unconfined nature of the Floridian Aquifer, the risk of groundwater contamination is very high in Beaufort County. Since the late 1970's, concerns have been raised over the issue of saltwater intrusion into the aquifer. As a result, since the 1980's, over \$40 million has been spent to provide alternative sources



Pervious paving infiltrates stormwater back into the soil thereby recharging groundwater.

of drinking water primarily from the Savannah River. As part of the “Sound Science Initiative”, Georgia contracted with the South Carolina DHEC to provide monitoring wells, which revealed that there are three separate points of saltwater intrusion into the aquifer in the county; one underlying northern Hilton Head Island, one underlying the Pinckney Island National Wildlife Refuge, and one under the Moss Creek area. These infiltration points are threatening the water quality for those residents in areas like Sawmill Creek, and Pritchardville that are on private wells and for developments still using groundwater for irrigation.

CONCLUSIONS

Irrigation for golf courses and other landscaped areas by far accounts for the greatest use for groundwater in Beaufort County. Therefore, reducing or eliminating the use of groundwater for irrigation would help to preserve the groundwater for the remaining residents who still rely on private wells. A logical source of available water for irrigation is the land disposal of treated wastewater. Another strategy aimed at recharging groundwater is utilizing more low impact development (LID) stormwater management techniques that utilize swales and pervious areas to infiltrate stormwater back into the soil.



Open Space

Protecting open space is a common thread among Beaufort County's natural resource goals and recommendations. Conservation easements and fee-simple purchases of land to limit or prevent future development is a powerful tool in protecting valuable habitat types, limiting development in environmentally sensitive areas, providing public access to natural amenities, and facilitating regional stormwater management.

EXISTING CONDITIONS

Currently 30,572 acres of land in Beaufort County are preserved through conservation easements and government and/or non-profit ownership. This makes up approximately 17% of the total land area. Map 5-10 shows the locations of these preserved lands. As undeveloped land becomes scarcer, the cost of acquiring land for open space increases. This fact has made the acquisition of open space for the purpose of preservation a top priority in Beaufort County.

LOCAL EFFORTS TO PRESERVE OPEN SPACE

There are essentially three methods used to preserve open space. The first is the fee simple purchase of a property by a governmental, non-profit or private entity for the purpose of preservation. The second method is through a conservation easement or purchase of development rights which allows the property owner to continue to own their property but limits future development through covenants. The third method is requiring by ordinance the set aside of a certain percentage of open space when land is developed. The most effective (and most expensive) way for local governments to control the use of land is to own it. Both Beaufort County and the Town of Hilton Head Island have programs that target purchasing properties to protect natural areas and to take land out of active development.



The Alan Ulmer property, a conservation easement purchased through the Rural and Critical Lands Preservation Program.

Beaufort County's Rural and Critical Lands Preservation Program: This program, established by ordinance in 1999, is aimed at preserving open space either by fee simple land purchases or the purchase of conservation easements on private property. Two successful bond referendums (2000 and 2006) have provided the

program with \$90 million in County funding. The County contracts with the Trust for Public Land (TPL) to manage the program, negotiate with property owners, and assist in the purchase of properties. The Rural and Critical Lands Preservation Board, representing a cross-section of Beaufort County, prioritizes properties and makes recommendations to County Council. In 2004, based on citizen input gathered at a number of public meetings, TPL assisted the County in developing “Greenprint” maps that define focus areas to target preservation efforts.



Fish Haul Beach, preserved by the Town of Hilton Head Island.

Hilton Head Island’s Land Acquisition Program: Hilton Head Island has its own land acquisition program, funded primarily by a real estate transfer fee (RETF) that generates approximately \$3.8 million annually for the Town. Hilton Head Island’s integrated approach to land acquisition and its funding is also unique. All of the potential funding sources, RETF, Beach Preservation Fees, Stormwater Utility Fees, general funds and grants feed into a matrix that takes into account all the activities that require land acquisition such as open space, parks, beach access, public facilities and municipal stormwater projects. This integrated approach invites inter-disciplinary solutions to Town needs and maximizes the potential of each of the funding sources.

Private/Non-Profit Sector Resource Protection Efforts: The protection of open space in Beaufort County is not in the exclusive domain of the public sector. The Beaufort County Open Land Trust, formed in 1971, is a non-profit organization dedicated to preserving vistas and natural areas through the purchase of land and conservation easements. In addition, the Sea Pines Forest Preserve, and open space on Spring Island and in Palmetto Bluff are three local examples of private sector efforts to preserve open space.

CONCLUSIONS

While Beaufort County has been very aggressive in securing open space, many of the preserved lands are discrete and unconnected. As growth continues, these natural areas will become more isolated and will not effectively be able to support healthy wildlife communities. In addition, as land becomes scarcer, it is more important to prioritize areas with outstanding natural resources in order to target future acquisitions of open space, and to target the preservation of greenways and wildlife corridors to connect natural areas.

Open space can serve many different needs, including the preservation of natural areas, provision of public access to water, recreation needs, relieving traffic congestion, and regional stormwater projects. There are also several methods and funding mechanisms that can be used to secure open space, including the Rural and Critical Lands Program, the Stormwater Utility fund, municipal programs such as Hilton Head Islands Land Acquisition Program, and open space preserved through ordinance requirements and development agreements. As open space

becomes scarcer and more expensive to acquire, it may become necessary to look more creatively at several different open space acquisition methods to achieve multiple objectives.



Recommendations

Recommendation 5-1: Cooperative Planning with Municipalities and Neighboring Counties

Beaufort County should continually work with its municipalities and neighboring counties to develop baseline standards and plan cooperatively to optimize the protection of natural resources at a regional level.

- Work toward the adoption of baseline standards for critical line buffers, stormwater BMPs, freshwater wetland protection, beach and dune protection, and the protection of trees and habitats.
- Centralize and standardize the collection and analysis of County, municipal, and state water quality monitoring data.
- Coordinate open space protection efforts by pooling and leveraging funds for the preservation of open space and coordinating existing preservation efforts across municipal and county boundaries.
- Coordinate natural resource planning with neighboring counties, with the recognition that development impacts natural resources and water quality across county boundaries.

Recommendation 5-2: Educational Outreach

Beaufort County should work to develop education programs aimed at informing local residents, builders, developers and realtors about the value of water quality and the region's key natural resources, and of County regulations that are designed to protect these resources.

- Dedicate additional staff and funding to environmental education programs.
- Better coordinate existing programs conducted by governmental and non-profit agencies.

Recommendation 5-3 : Enforcement

Beaufort County should dedicate additional staff resources to the enforcement of County regulations designed to protect water quality and protect natural resources.

Recommendation 5- 4: Implement the SAMP

Beaufort County should address the remaining recommendations from the Beaufort SAMP.

- River Quality Overlay District (RQOD): Review the adequacy of existing regulations already adopted, such as river buffers and stormwater BMPs to determine if the intent of the SAMP is already being met.
- On Site Disposal System (OSDS) program: Develop a comprehensive regional approach to reducing the negative impacts of on-site septic systems to surface water quality.
- Coordination of Water Quality Data Collection: Establish a structure to coordinate all water quality monitoring activities in the County.

Recommendation 5-5 : Open Space Preservation

Beaufort County should cooperate and continue to emphasize protection of public and private open space.

- Continue to support and fund Rural and Critical Lands Preservation Program
- Use local funds to leverage funds from state, federal, and non-governmental organization programs
- Pursue the acquisition of sites that meet multiple objectives, such as the preservation of natural resources, passive recreation, public access to water, and regional stormwater projects.

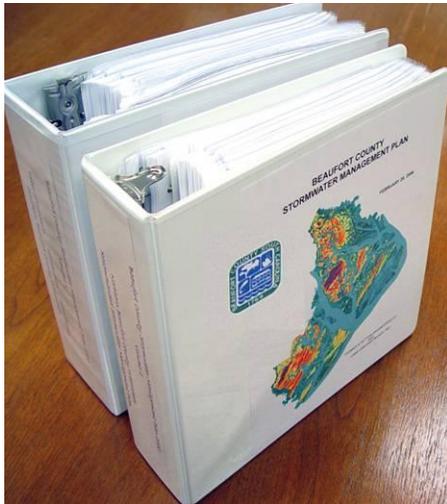
Recommendation 5- 6: Soils

Beaufort County should take greater consideration of soil types in future land use planning, site plan review and locating future infrastructure projects and County facilities.

Recommendation 5- 7: New Approaches to Stormwater Management

Beaufort County should utilize the Stormwater Management Utility Board to explore, develop and promote new approaches to stormwater management

- Continually reevaluate the Stormwater BMP Manual and its application and enforcement to increase the use of Low Impact Development (LID) techniques, such as bioretention, green roofs, pervious paving, and cisterns that promote water conservation and groundwater recharge.
- Design stormwater management in sensitive headwater areas to 100-year storm event to lessen the impact of freshwater surges and channelization on marine life.
- When evaluating the impact of new development, take into account the collective impacts of existing development in the same sub-watershed.



Beaufort County Stormwater Management Plan (2006)

- Incorporate soil types as a criterion to determine the appropriate percentage of impervious surface within a development.
- Evaluate the necessity designing stormwater management to limit nitrogen pollution in runoff. Adjust Stormwater BMP Manual accordingly. If nitrogen standards are enacted, allow high density developments to mitigate the impact of nitrogen pollution by retrofitting stormwater management devices in older non-conforming developments within the same sub-watershed.
- Continually evaluate how stormwater standards can be modified to help reduce FEMA flood insurance rates.

Recommendation 5-8 : Stormwater Utility

Beaufort County should continue to implement the Stormwater Utility with a priority placed on retrofitting stormwater in older moderate and high density developments that predate the adoption of stormwater standards in Beaufort County.

- Work toward a joint capital improvements plan (CIP) for County and municipal Stormwater Utility projects.
- Utilize Rural and Critical Lands Preservation Program to purchase key sites that serve regional stormwater utility needs.

Recommendation 5-9 : Water Quality Monitoring

Beaufort County should work toward centralizing and standardizing the collection and analysis of water quality data.

- Establish what are considered acceptable and unacceptable water quality standards on the sub-watershed level.
- Update BMP Manual to adjust to new information.

Recommendation 5- 10: Other Water Quality Measures

Beaufort County should pursue additional measures aimed at improving water quality.

- Assess the effectiveness of existing County and state policies to protect small marsh islands from over-development.
- Continue to expand the ability to help the public discard toxic items that can degrade water quality.



Typical items collected during a County sponsored household hazardous waste collection event.

Recommendation 5-11 : Tree Protection Standards

Beaufort County should maintain good standards both to protect mature and specimen trees and to plant new trees when property is developed or redeveloped.

- Revise Beaufort County's tree standards to distinguish between "mature" trees and "specimen" trees, giving greater protection to specimen trees.
- Continue to require and increase the enforcement of the protection of root zones and canopies of trees during construction.



Preserved trees in Bluffton.

- Encourage the removal of non-native invasive tree species such as Chinese tallow, Chinaberry, and mimosa.
- Revise parking standards to enlarge islands and medians so that they are of sufficient width to support large shade trees.
- Require replacement trees planted for those removed to be retained in perpetuity or replaced as they die or become hazardous
- Require caliper inch-for-inch replacement for illegal tree removal with a higher replacement ratio assigned for specimen trees.
- Beaufort County should adhere to its tree standards for County properties, parks, and preserved areas.

Recommendation 5- 12: Tree Management Plan

Beaufort County should require new developments and encourage existing developments to adopt a tree management plan.

- The plan should include a map of all common areas, their purposes and the trees that currently exist in the common areas.
- The plan should address such aspects as the thinning of trees to provide sufficient light to keep desirable trees healthy, and the planting of new trees and shrubs to replace aging or unhealthy trees.
- Beaufort County should work with the Clemson Extension Master Gardner Program to complete tree management plans for the County's parks and preserved lands.

Recommendation 5- 13: Trees - Educational Outreach

Beaufort County should build on its current partnership with Clemson University Extension Service to promote the value of tree protection and proper tree care.

- Provide information on identifying backyard trees, evaluating the health of trees, keeping specimen trees healthy, and planting and caring for new trees.
- Promote good tree maintenance such as root zone protection and sustainable pruning techniques.
- Encourage residents to submit information about outstanding specimen trees to assist the County to establish a GIS database to aid in the evaluation of site plans.

Recommendation 5- 14: Wildlife and Habitat Protection Standards

Beaufort County should develop standards aimed at protecting wildlife and local wildlife habitat.

- Develop mitigation standards for development projects to protect and encourage wildlife. Standards may include replanting of native vertical layers of vegetation, installation of thickets, keeping dead trees where they do not present a hazard, and installation of rest/nest boxes

- Encourage new development to be wildlife friendly and to provide linkages between wildlife habitats through a combination of ordinance requirements and incentives.
- Develop regulations to protect animal and plant species defined as Species of Special Concern by the State of South Carolina
- Promote innovative road construction techniques that are wildlife friendly. Techniques include culverts for under-road crossings, rolled curbing, traffic calming devices, and signage to alert motorists.

Recommendation 5-15: Wildlife and Habitat Educational Outreach

Beaufort County should encourage property owners to landscape their properties to be more wildlife friendly.

- Develop an education program aimed at informing property owners of the benefits of preserving or enhancing native vegetation.
- Inform the public about programs for certifying backyard wildlife habitat offered by the National Wildlife Federation, the National Audubon Society, and the Clemson University Extension Service (Carolina Yards and Neighborhoods).



Consequences of beach erosion and the lack of a healthy dune system.

Recommendation 5- 16: Beaches and Dunes

Beaufort County should recognize that its beaches and dunes are both an important public resource and are valuable as a natural storm barrier protecting life and property for those living along the coast. The following policy components are recommended:

- All new beachfront developments and redevelopments should enhance or reestablish dune systems.
- All native dune plants that provide dune stabilization should be protected.
- Require a natively vegetated buffer between the dune system and development with planting standards and a prescriptive list of native plants.
- Restrict the size and location of structures in dune systems and buffer areas, such as decks and dune walkovers. Dune walkovers should be constructed so that they do not restrict the free flow of wildlife.
- Prohibit the direct discharge of storm water and pool water into dune systems or onto beaches.
- In order to protect sea turtles, all lighting for parcels fronting barrier island beaches and dunes should be configured so as to ensure that no light is visible from the beaches or dunes during sea turtle nesting season.
- Beaufort County should consult with the SCDNR Sea Turtle Program on the proper placement and configuration of sand fencing, if it is used to reestablish dune systems.

- Beaufort County should exercise its authority to purchase public access when reviewing development plans on beachfront properties, in order to gain as much public beach access as possible when property is being redeveloped.

Recommendation 5- 17: Network of Open Spaces

Beaufort County should work toward a network of open spaces that protects critical habitats and provides wildlife corridors.

- Continue to fund the Rural and Critical Lands Preservation Program and to update the Greenprint map.
- Develop better critical habitat identification tools utilizing DNR, NOAA data, and aerial photography to assist in identifying lands for preservation.
- Coordinate public and private preserved open space
- Explore the feasibility of an open space land bank where fees would be collected in lieu of ordinance required open space set asides and applied to the purchase and preservation of larger more critical lands



Privately preserved open space on Spring Island.

Recommendation 5- 18: Freshwater Wetlands

Beaufort County should continue to acknowledge the importance of freshwater wetlands as natural assets worthy of protection because of their vital role as natural stormwater drainage systems and as habitats for plants and animals.

- The County should adopt a zero net loss policy on isolated freshwater wetlands with an emphasis placed on avoiding negative impacts on wetlands.
 - Where avoidance is not possible, emphasize minimizing and mitigating impacts.
 - Provide incentives for development plans that are designed around freshwater wetlands
 - Mitigation of impacted wetlands should be on site. When it is not feasible, in-kind mitigation acre for acre in same the watershed should be considered a last resort.
 - Once a property is developed, wetlands that are preserved or mitigated and their buffers should be given permanent protection.
- High quality wetlands and wetlands with rookeries should be managed to maintain the site as suitable rookery habitat.
- Freshwater wetlands should have native, upland buffers.
- Stormwater management should be designed so to provide no negative impacts to freshwater wetlands.

Recommendation 5- 19: Protect Groundwater Quality

Preserve groundwater quality by reducing and eliminating heavy usage of groundwater resources in the county.

- Require all new developments to hookup to public water.
- Require Low Impact Development (LID) stormwater management techniques that infiltrate stormwater runoff into the soil, thereby recharging groundwater.
- Encourage heavy users of irrigation (golf courses, landscaping) to use treated effluent for irrigation.
- Discourage wells for the irrigation of residential landscaping.
- Develop standards for geothermal HVAC systems that recycle the use of groundwater.

Recommendation 5- 20: Climate Change and Rising Sea-Level

Beaufort County should anticipate and plan for the impacts of climate change and sea level rise.

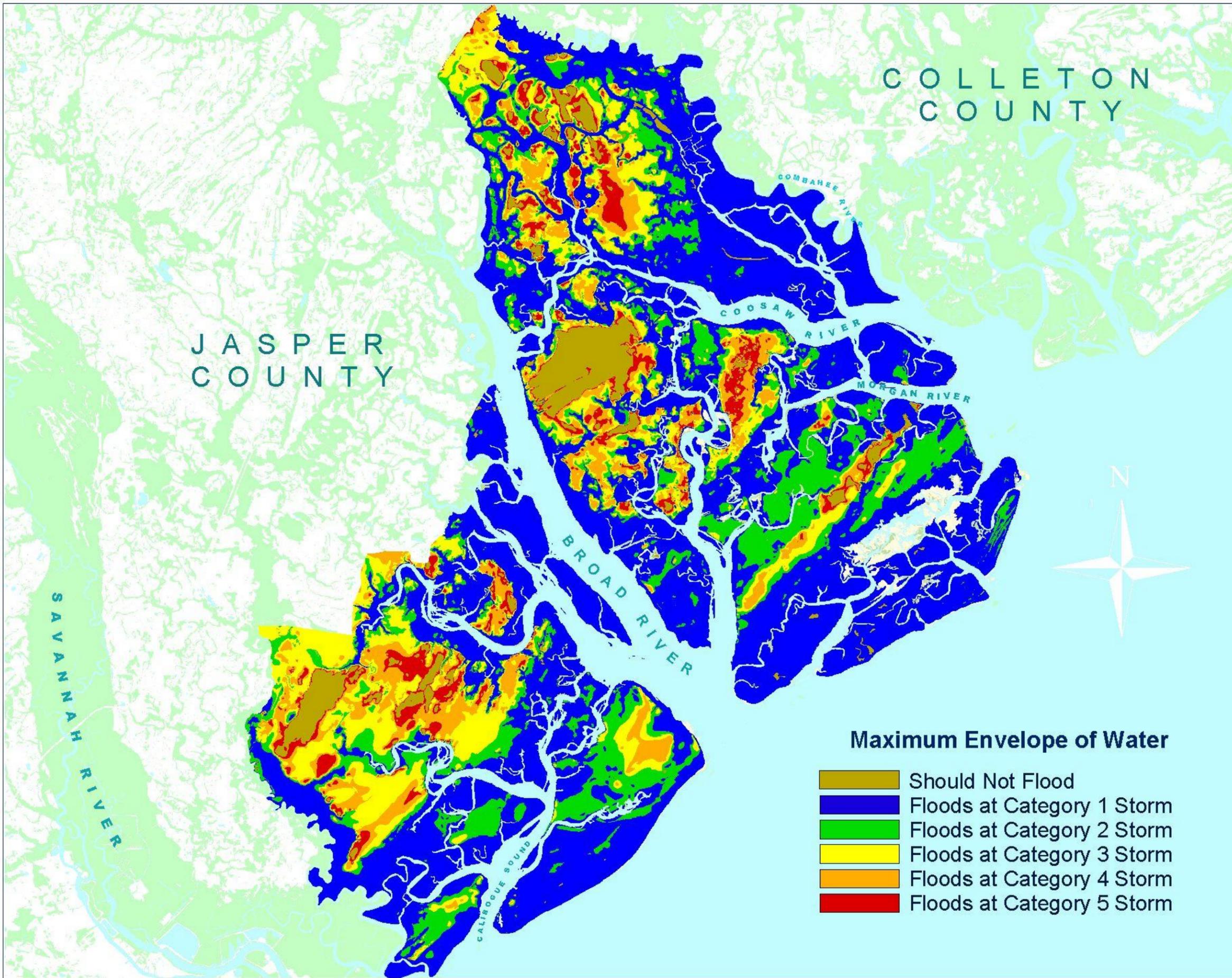
- Anticipate Sea Level Rise. Work with the U.S. Geological Survey and other monitoring agencies to track inlet and ocean levels; utilize estimates for mean sea level rise to map potential areas subject to future inundation; and work with FEMA to amend flood maps for any areas subject to increased flooding from a rise in sea level.
- Plan for Sea Level Rise. The potential impacts of sea level rise on low-lying areas should be a consideration in future land use planning, site plan review, and the location of future roads and other public facilities.
- Disclosure: Consider requiring a disclosure statement when development and building permits are issued on low-lying property acknowledging that the County is not committed to stabilizing property or maintaining private roads and causeways by constructing seawalls, levees or other devices.

**Chapter
5
Natural
Resources**

Map 5 - 1

**SLOSH
Sea, Lake, &
Overland Surges
from Hurricanes**

**2010
Beaufort County
Comprehensive
Plan**

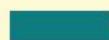


**Chapter
5
Natural
Resources**

Map 5 - 2

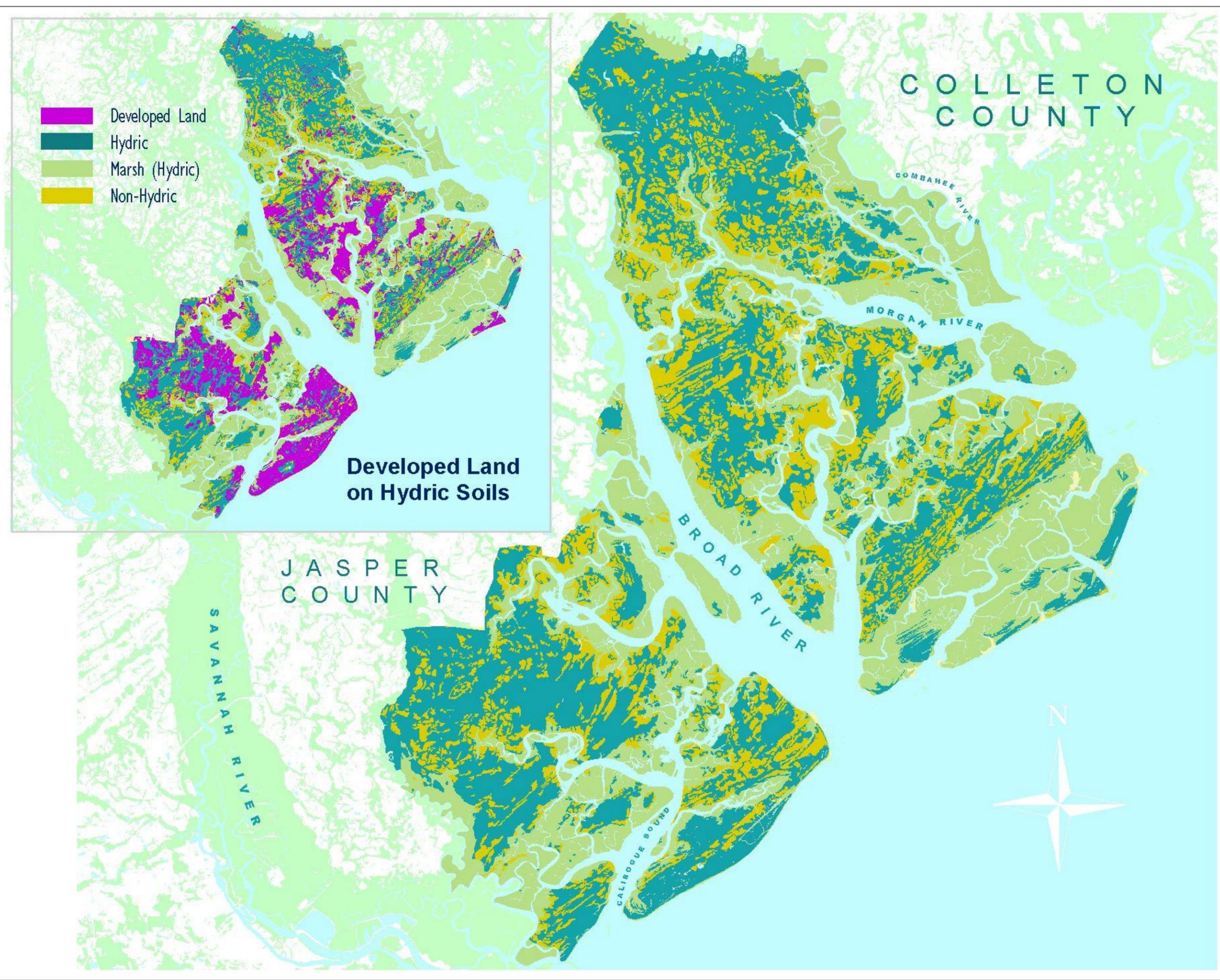
**Soil
Hydrology**

**Percent of
Soil Acreage**

-  Hydric 40%
-  Marsh (Hydric) 39%
-  Non-Hydric 21%

Source: USDA NRCS

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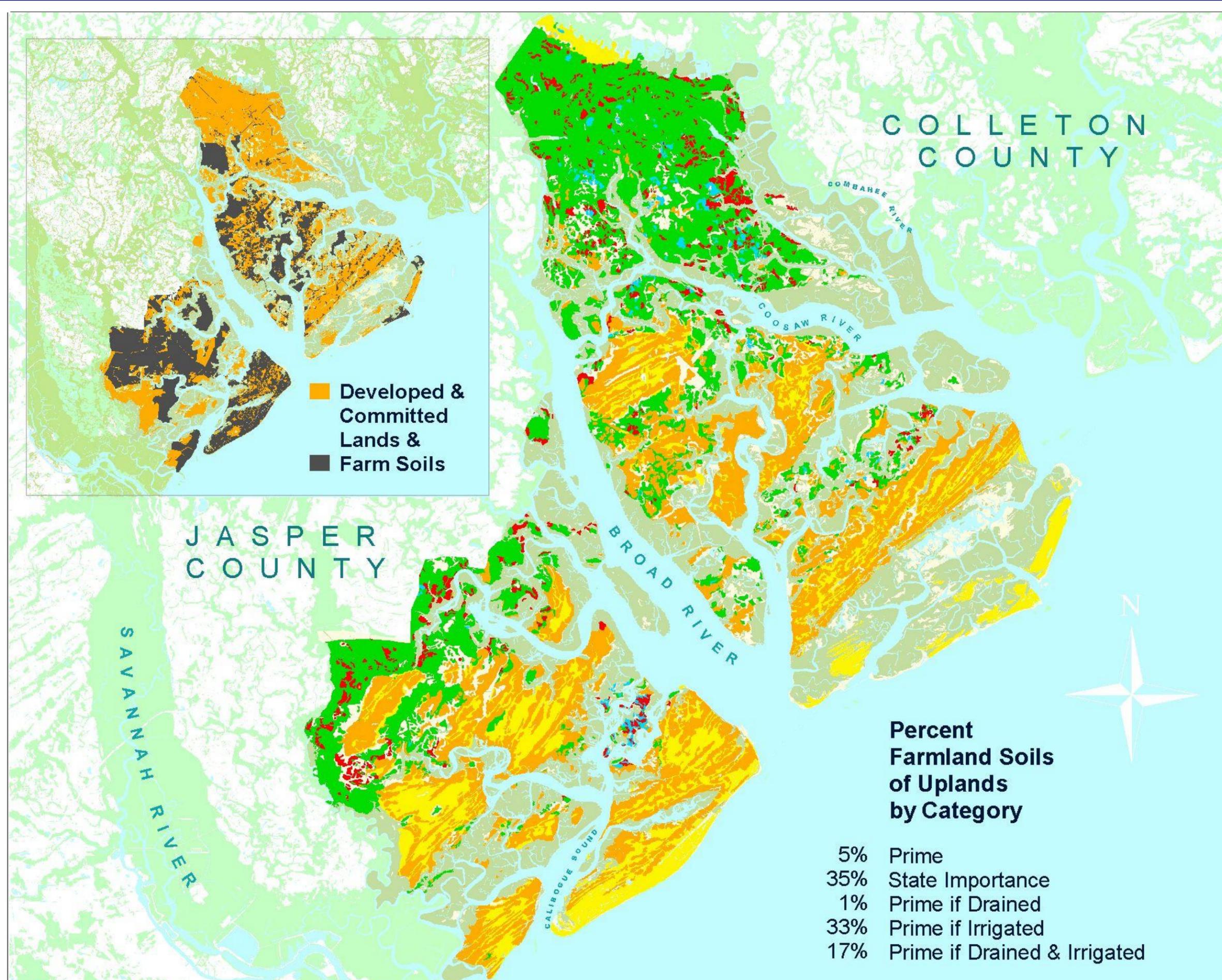
Map 5 - 3
**Suitability of
Soils
For Agriculture**

- Prime
- State Importance
- Prime if Drained
- Prime if Irrigated
- Prime if Drained & Irrigated

BASE LAYER

- Water
- Marshland
- Not Classified as Farm Soil

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**Percent
Farmland Soils
of Uplands
by Category**

5%	Prime
35%	State Importance
1%	Prime if Drained
33%	Prime if Irrigated
17%	Prime if Drained & Irrigated

**Developed &
Committed
Lands &
Farm Soils**

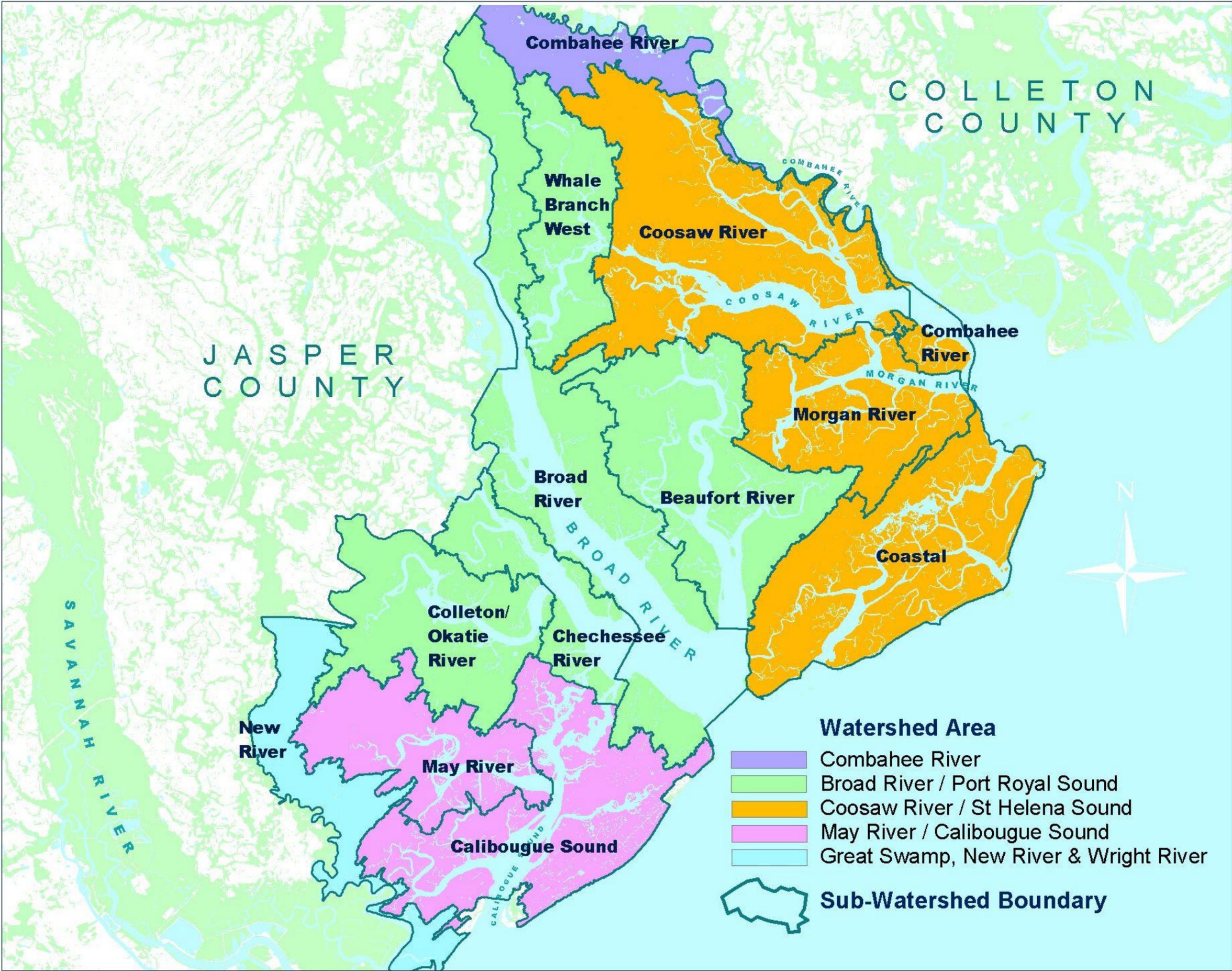
**Chapter
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Map 5 - 4

**County Watersheds
& Sub-Watersheds**

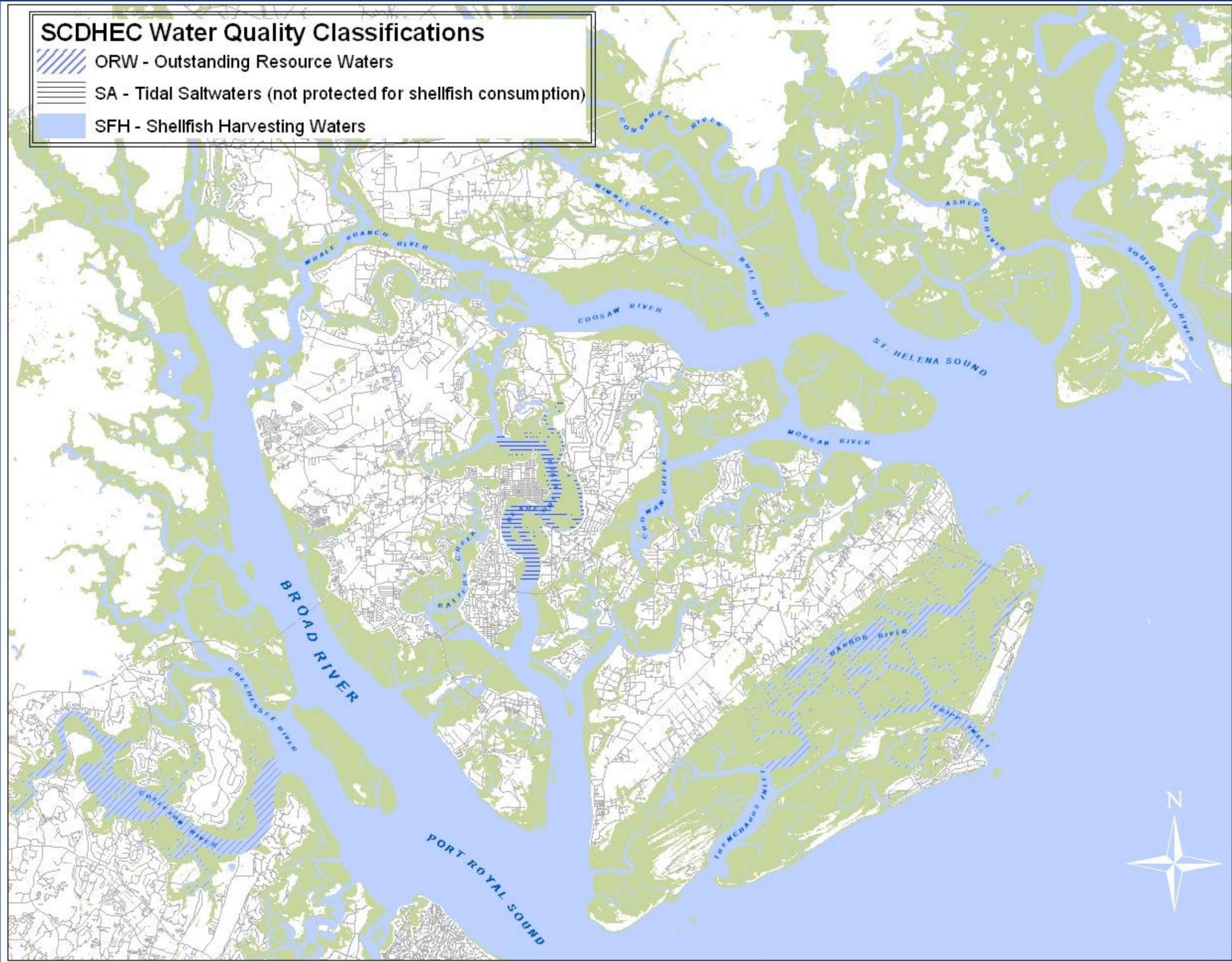
Data Source:
Watersheds, SCDHEC
Sub-Watersheds, Thomas & Hutton Engineering Co.

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SCDHEC Water Quality Classifications

-  ORW - Outstanding Resource Waters
-  SA - Tidal Saltwaters (not protected for shellfish consumption)
-  SFH - Shellfish Harvesting Waters



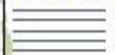
Chapter 5 Natural Resources

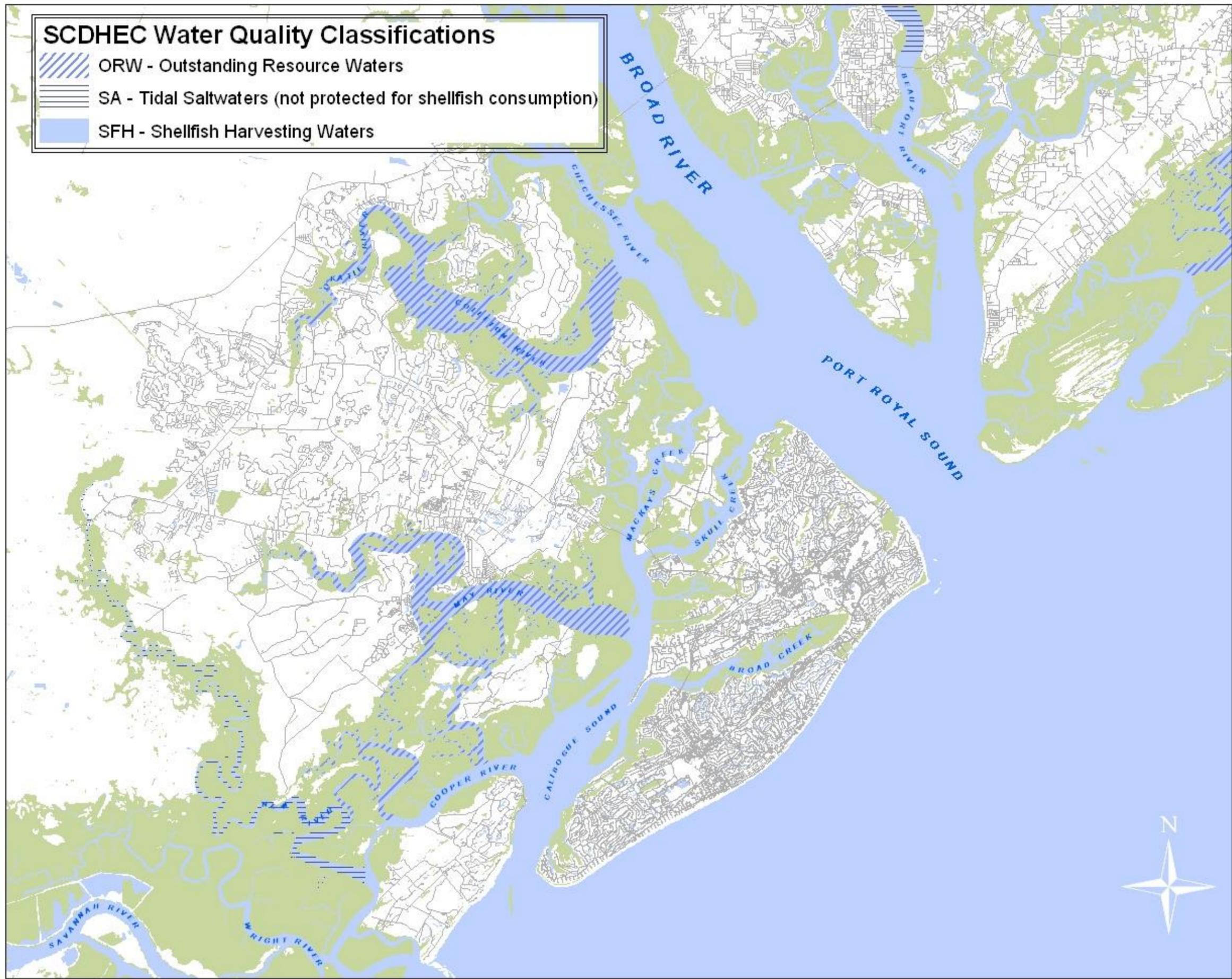
Map 5-5

Water Quality
Classifications:
Northern
Beaufort County

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SCDHEC Water Quality Classifications

-  ORW - Outstanding Resource Waters
-  SA - Tidal Saltwaters (not protected for shellfish consumption)
-  SFH - Shellfish Harvesting Waters



Chapter 5 Natural Resources

Map 5-6

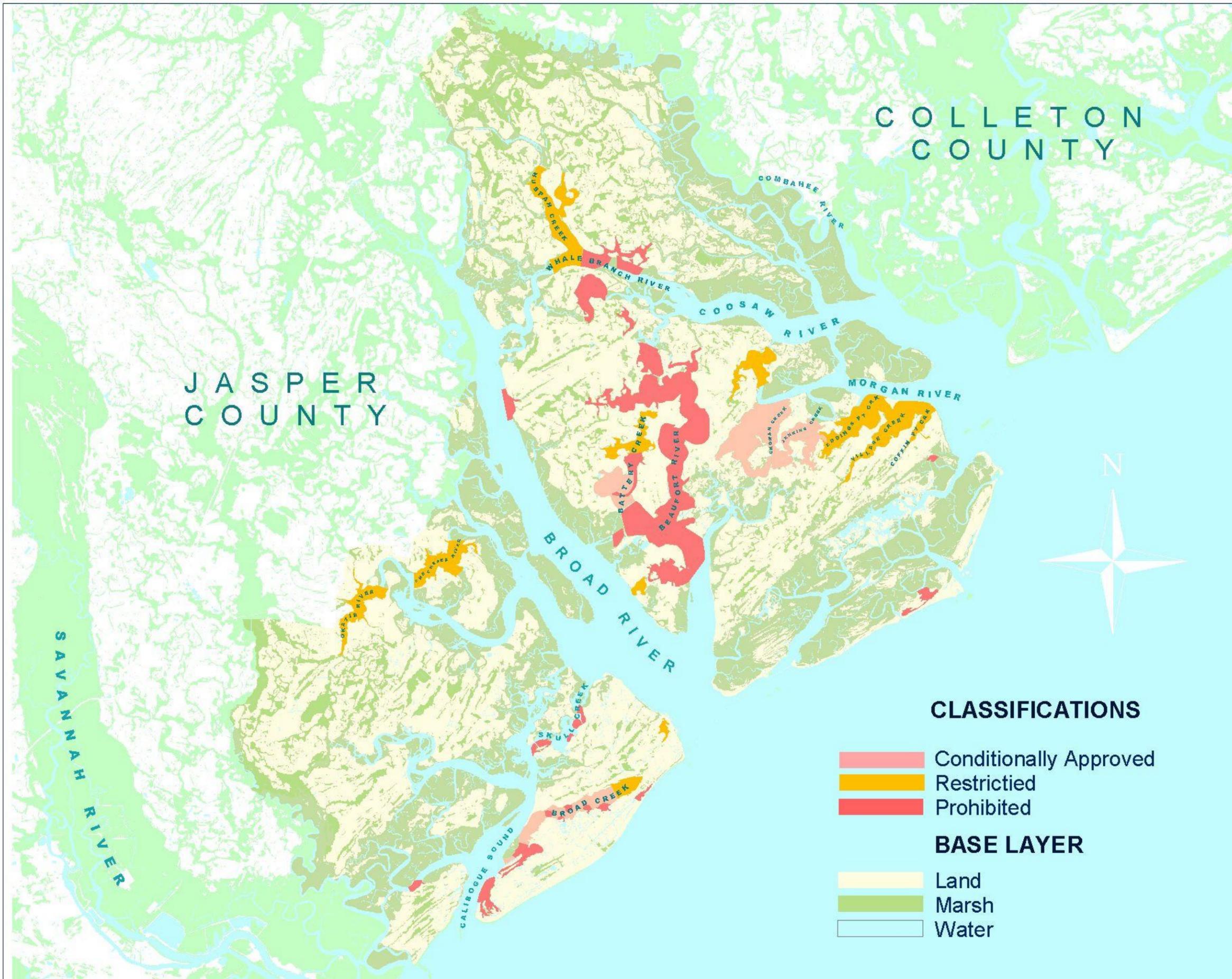
Water Quality Classifications: Southern Beaufort County

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Map 5 - 7

**Status of
Shellfish Beds**



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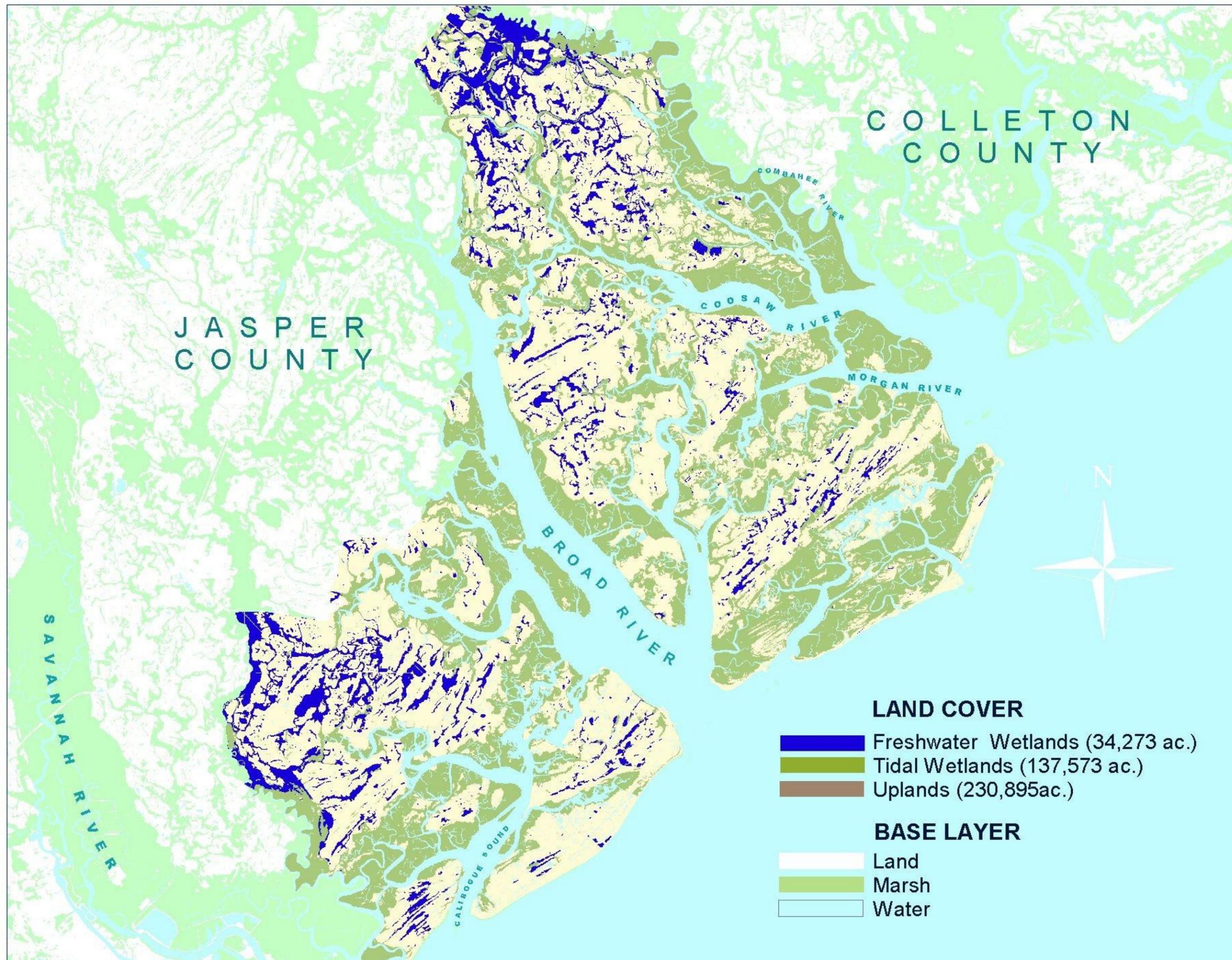
**Chapter
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Map 5 - 8

**Freshwater
Wetlands**

Data Source: National Wetlands Inventory

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POTENTIOMETRIC SURFACE OF THE FLORIDAN AQUIFER SYSTEM IN SOUTHERN SOUTH CAROLINA, September 1998

By
Camille Ransom, III and James L. White

**Chapter
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Resources**

Map 5 - 9

**Aquifer Recharge Areas
and
Cones of Depression**

-  Upper Floridian Aquifer
-  Middle/Lower Floridian Aquifer
-  Observation Wells
- 5 - Potentiometric Contour
[Shows altitude at which water level would have stored in tightly cased wells. Hachures indicate depression. Contour interval, in feet while Datum is mean sea level.]

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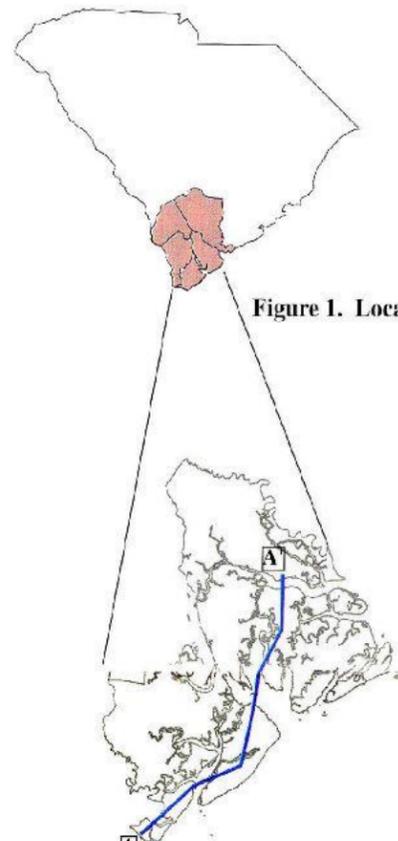


Figure 1. Location of Study Area

Figure 1a. Location of cross-section A - A'

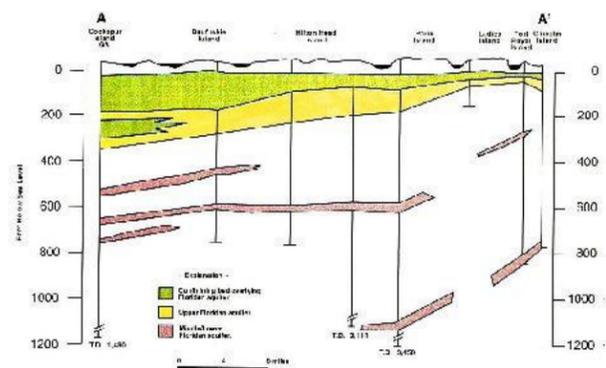
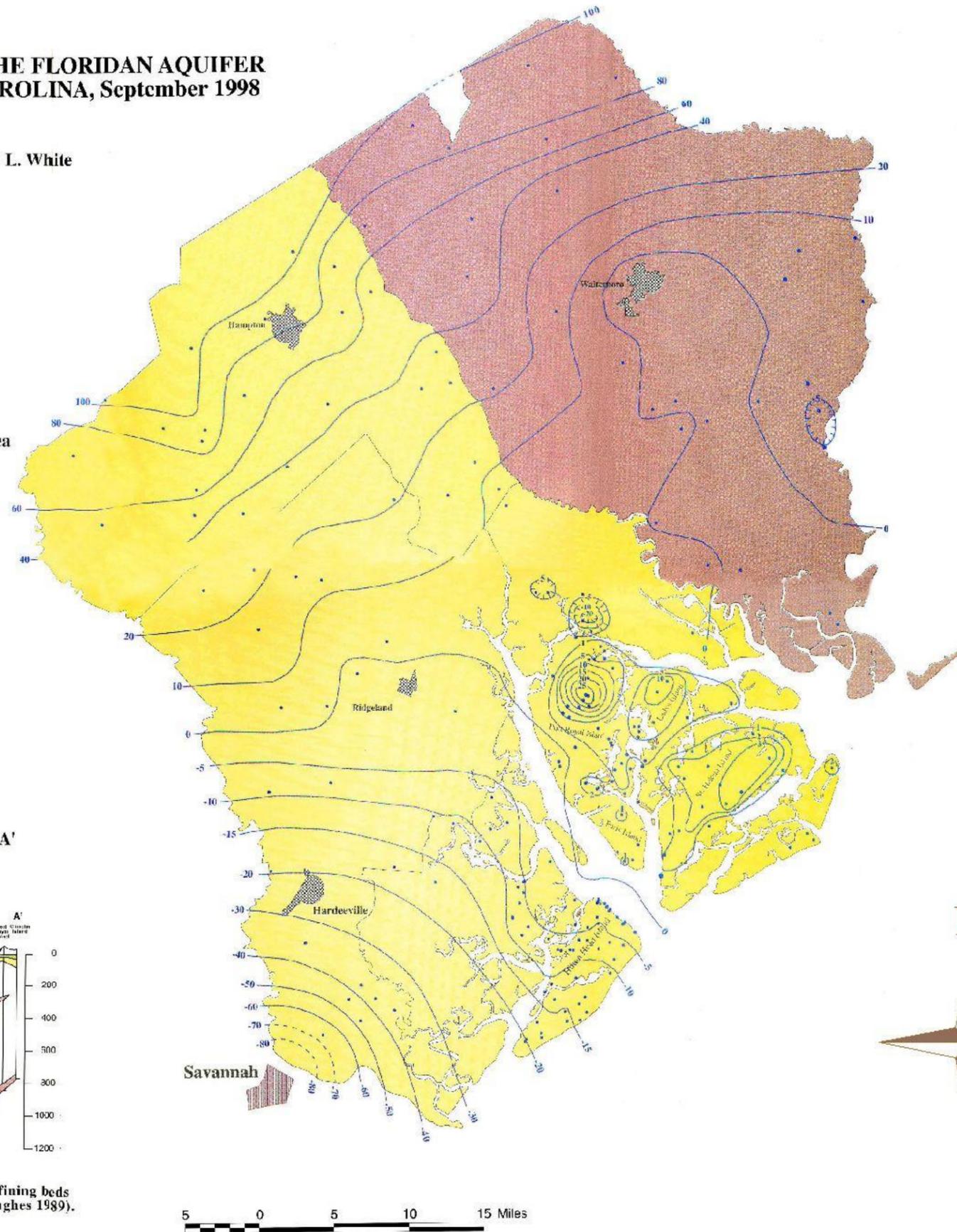


Figure 2. Distribution of permeable units and confining beds of the Floridan Aquifer System (after Hughes 1989).

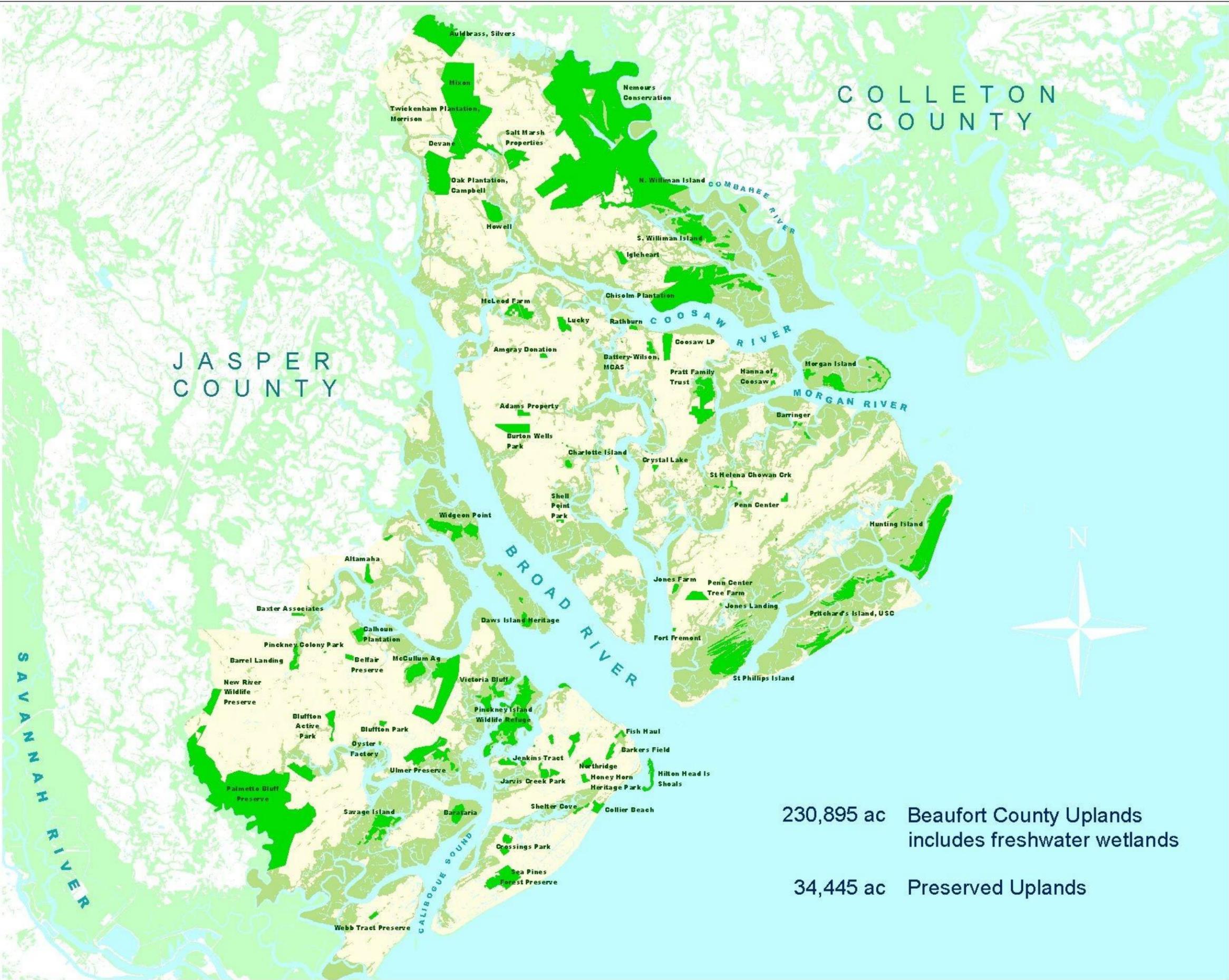
**Chapter
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Map 5 - 10

**Preserved
Open Space**

- Preserved Lands

- BASE LAYER**
- Water
- Marsh
- County Upland



230,895 ac Beaufort County Uplands includes freshwater wetlands

34,445 ac Preserved Uplands

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